MLS tropospheric CO validation

AVE Houston 2004+2005

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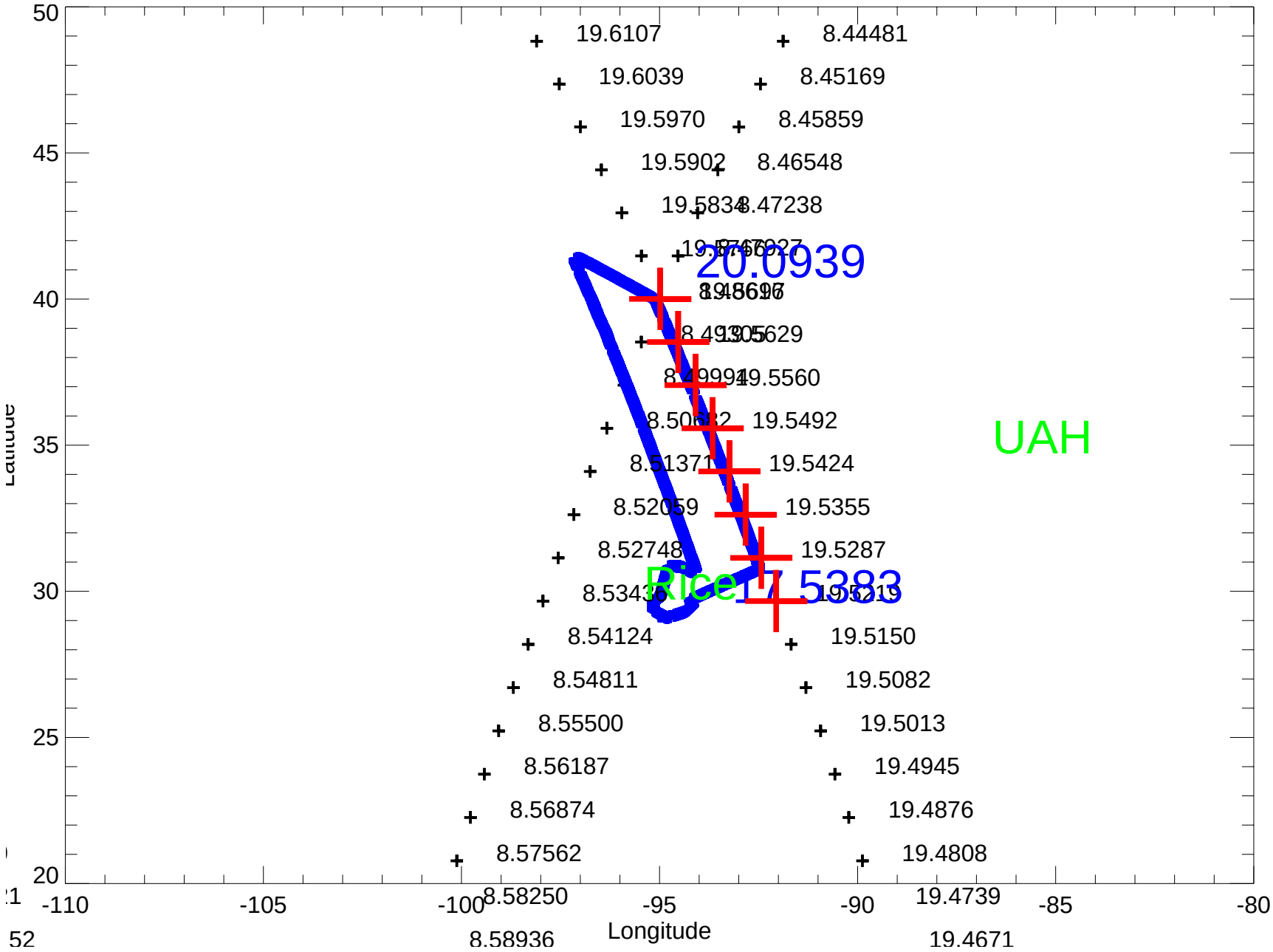
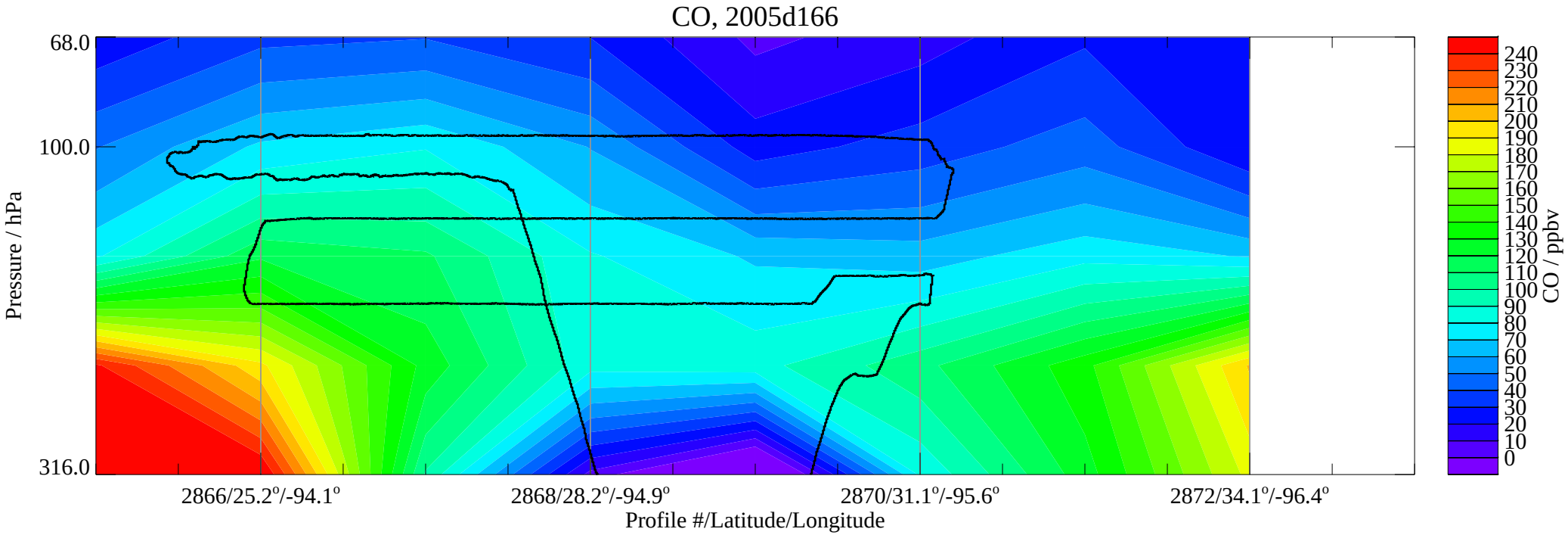
- AVE Houston (WB-57) flights sample mainly the troposphere (PAVE mainly stratosphere, still to be analysed for tropospheric CO).
- CO measured by two in-situ instruments: Argus and WAS.
- Flight paths were chosen along/near MLS track.

AVE Houston 2004+2005, typical flight/MLS track



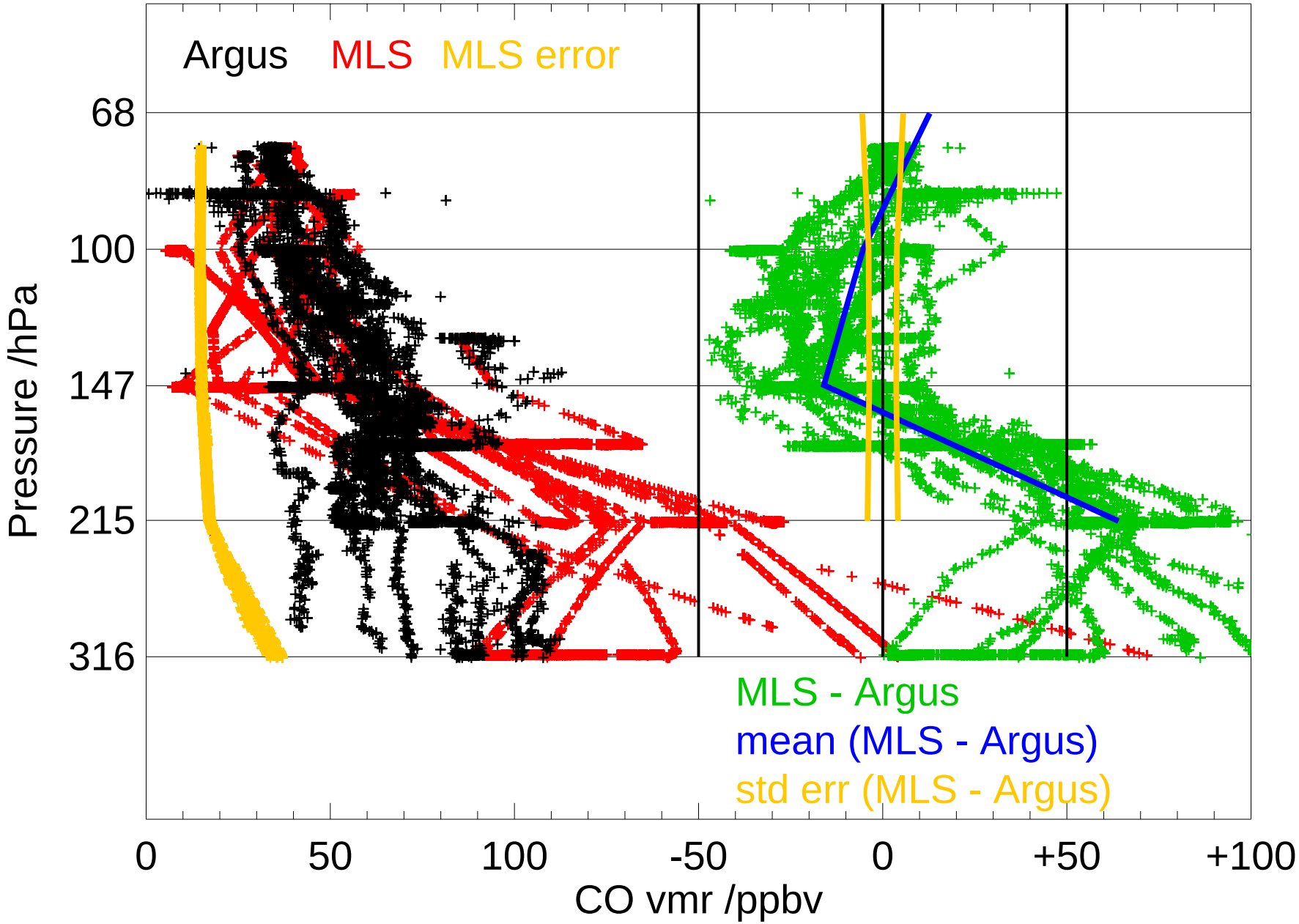
- Coincidences chosen for measurements close ($\sim 0.2^\circ$ longitude) to MLS track. Time coincidence ± 2 hours.
- WB-57 track, coincident MLS profile positions. (UT of MLS profiles , WB-57 start and half-way points.)

AVE Houston 2004+2005, typical flight/MLS cross-section

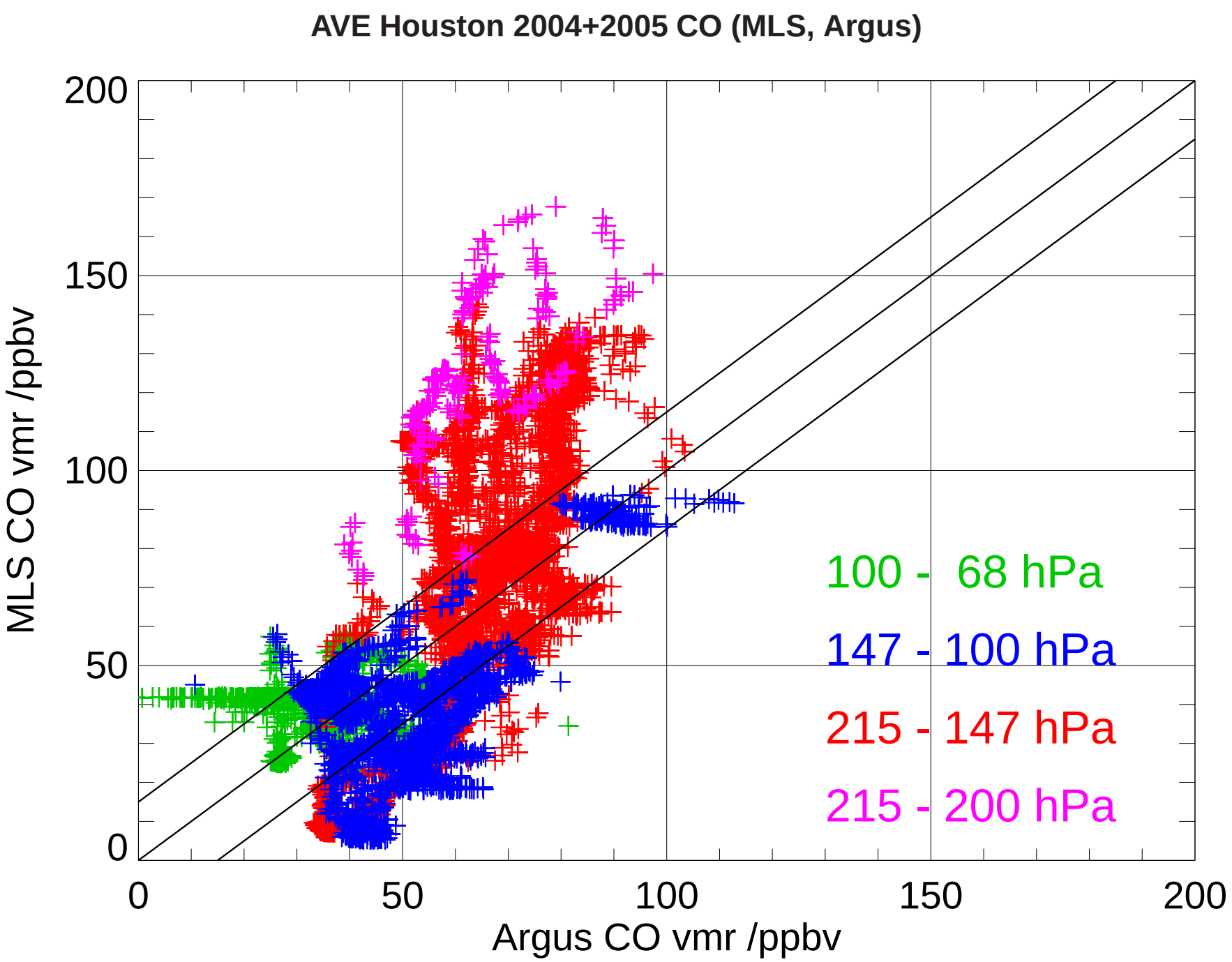


- Flight path along the curtain of MLS profiles.
- Compare in-situ data with bi-linearly interpolated MLS data.

AVE Houston 2004+2005 CO (MLS, Argus)

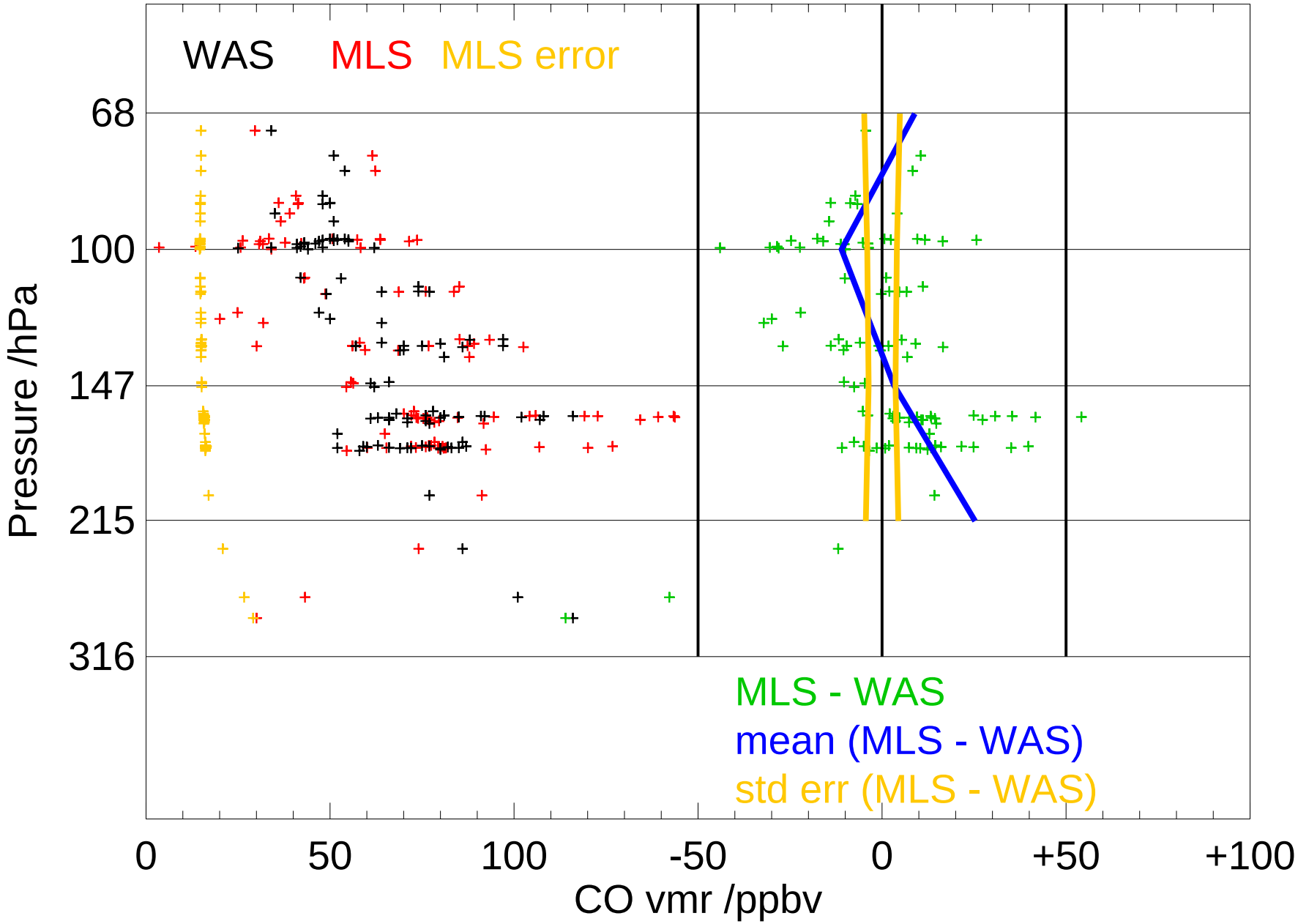


- MLS below 215 hPa not useful in current version (V1.5).
- Argus error ~ 6.5 ppbv, std err dominated by MLS.
- MLS $\sim 2\times$ Argus at 215 hPa, known MLS problem. Currently, unknown solution!

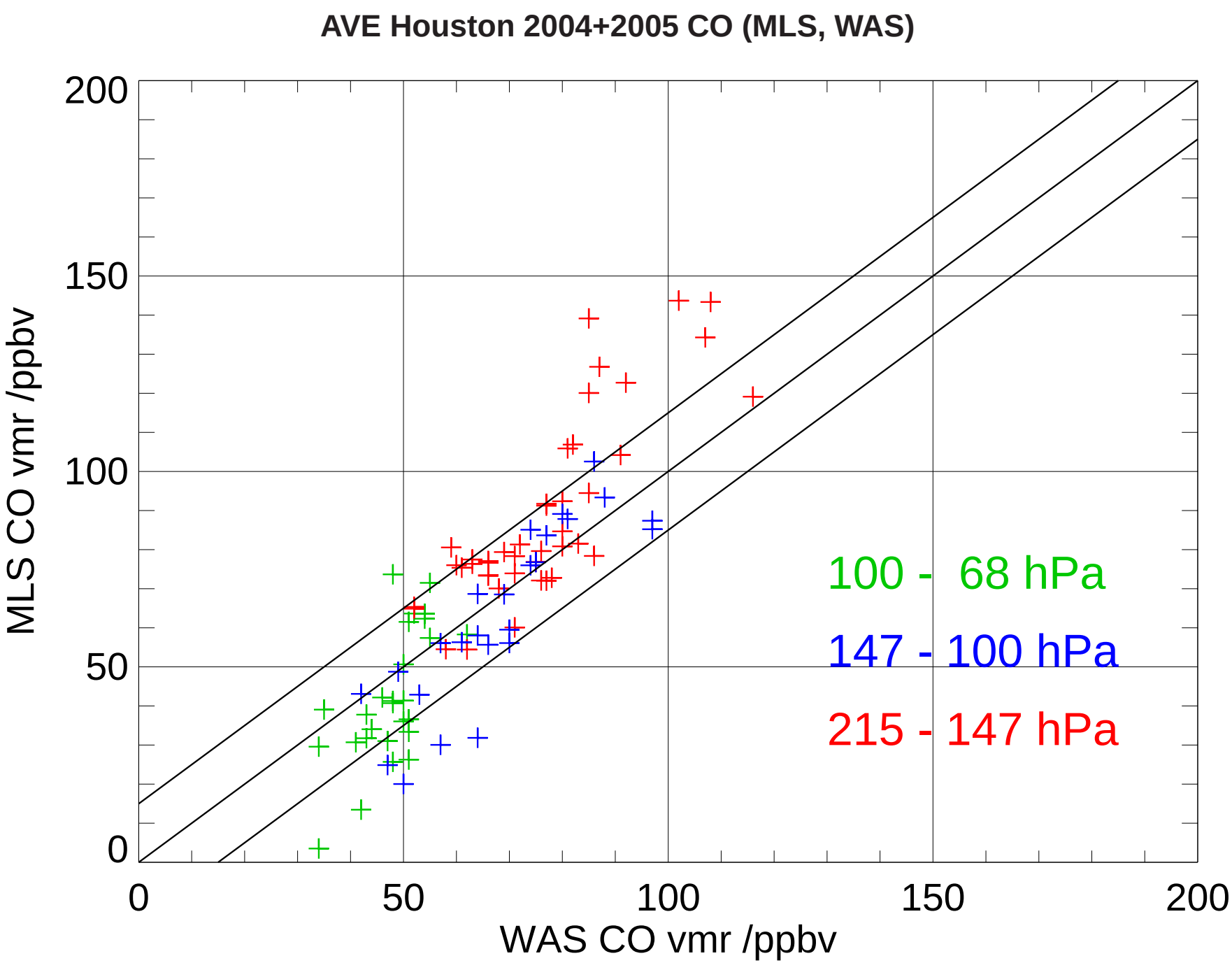


- MLS biased low in 147–100 hPa, high in 215–147 hPa.
- MLS matches Argus for enhanced CO (90 ppbv) in 147–100 hPa.

AVE Houston 2004+2005 CO (MLS, WAS)



- (Preliminary WAS data provided by Elliot Atlas.)
- MLS – WAS has similar behaviour to MLS – Argus: positive bias 215–147 hPa, negative bias 147–100 hPa.



- MLS – WAS has similar behaviour to MLS – Argus.

Summary

- AVE flights have provided very useful validation data for MLS carbon monoxide.
- They confirm the $\sim 2\times$ scaling error of MLS CO at 215 hPa.
- They also show that MLS has a low bias at 147 hPa for background levels (50 ppbv) of CO.
- Work on UT CO for version 2 of the MLS retrieval will concentrate on improving the 215 hPa data.